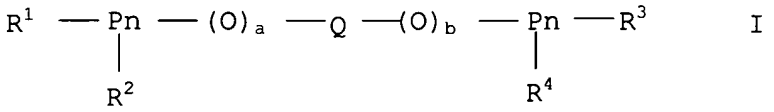
AMENDMENTS TO THE CLAIMS

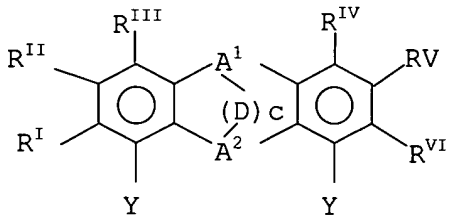
1. (Original) A process for preparing dialdehydes and/or ethylenically unsaturated monoaldehydes by reacting at least one compound having at least two ethylenically unsaturated double bonds with carbon monoxide and hydrogen in the presence of a hydroformylation catalyst comprising at least one complex of a metal of transition group VIII with at least one ligand selected from among chelating pnicogen compounds of the formula I,



I

where

Q is a bridging group of the formula



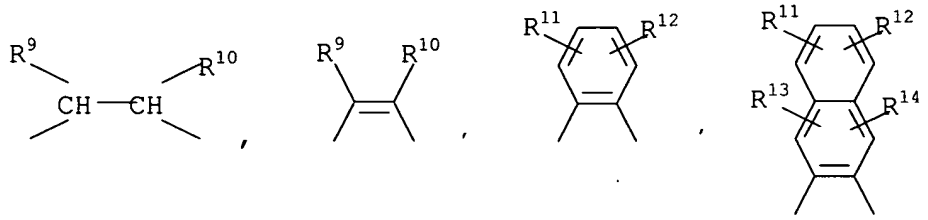
where

A^1 and A^2 are each, independently of one another, O, S, SiR^aR^b, NR^c or CR^dR^e, where

R^a,R^b and R^c are each, independently of one another, hydrogen, alkyl, cycloalkyl, heterocycloalkyl, aryl or hetaryl,

R^d and R^e are each, independently of one another, hydrogen, alkyl, cycloalkyl, heterocycloalkyl, aryl or hetaryl or the group R^d together with a further group R^d or the group R^e together with a further group R^e form an intramolecular bridging group D,

D is a divalent bridging group selected from among the groups



where

R^9 and R^{10} are each, independently of one another, hydrogen, alkyl, cycloalkyl, aryl, halogen, trifluoromethyl, carboxyl, carboxylate or cyano or are joined to one another to form a C_3-C_4-alkylene bridge,

R^{11}, R^{12}, R^{13} and R^{14} are each, independently of one another, hydrogen, alkyl, cycloalkyl, aryl, halogen, trifluoromethyl, COOH, carboxylate, cyano, alkoxy, SO_3H, sulfonate, NE^1E^2, alkylene-$NE^1E^2E^{3+}X^-$, acyl or nitro,

c 0 or 1,

Y is a chemical bond,

R^I, R^{II}, R^{III}, R^{IV}, R^V and R^{VI} are each, independently of one another, hydrogen, alkyl, cycloalkyl, heterocycloalkyl, aryl, hetaryl, $COOR^f$, COO^-M^+, SO_3R^f, $SO^-{}_3M^+$, NE^1E^2, $NE^1E^2E^{3+}X^-$, alkylene–$NE^1E^2E^{3+}X^-$, OR^f, SR^f, $(CHR^gCH_2O)_xR^f$, $(CH_2N(E^1))_xR^f$, $(CH_2CH_2N(E^1))_xR^f$, halogen, trifluoromethyl, nitro, acyl or cyano,

where

R^f, E^1, E^2 and E^3 are identical or different radicals selected from among hydrogen, alkyl, cycloalkyl and aryl,

R^g is hydrogen, methyl or ethyl,

M^+ is a cation,

X^- is an anion, and

x is an integer from 1 to 120,

or

two adjacent radicals selected from among R^{I}, R^{II}, R^{III}, R^{IV}, R^{V} and R^{VI} together with two adjacent carbon atoms of the benzene ring to which they are bound for a fused ring system having 1, 2 or 3 further rings,

a and b are each, independently of one another, 0 or 1,

Pn is a pnicogen atom selected from among the elements phosphorus, arsenic and antimony,

and

R^1, R^2, R^3, R^4 are each, independently of one another, hetaryl, hetaryloxy, alkyl, alkoxy, aryl, aryloxy, cycloalkyl, cycloalkoxy, heterocycloalkyl, heterocycloalkoxy or an NE^1E^2 group, with the proviso that R^1 and R^3 are pyrrole groups bound via the nitrogen atom to the pnicogen atom Pn

or R^1 together with R^2 and/or R^3 together with R^4 form a divalent group E of the formula

Py-I-W

where

Py is a pyrrole group which is bound via the pyrrole nitrogen atom to the pnicogen atom Pn,

I is a chemical bond or O, S, SiR^aR^b, NR^c, substituted or unsubstituted C_1-C_{10}-alkylene or CR^hR^i,

W is cycloalkyl, cycloalkoxy, aryl, aryloxy, hetaryl or hetaryloxy,

and

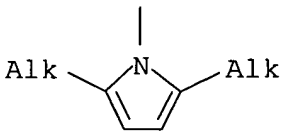
R^h and R^i are each, independently of one another, hydrogen, alkyl, cycloalkyl, heterocycloalkyl, aryl or hetaryl,

or R^1 together with R^2 and/or R^3 together with R^4 form a bispyrrole group of the formula

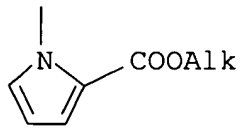
Py-I-Py

bound via the nitrogen atoms to the pnicogen atom Pn.

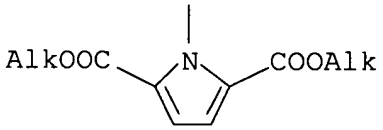
2. (Original) A process as claimed in claim 1, wherein at least one ligand of the formula I, in which the radicals R^1, R^2, R^3 and R^4 are selected independently from among groups of the formulae I.a to I.k



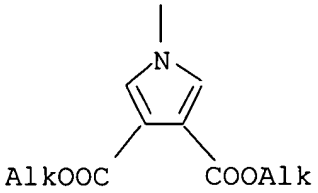
(I.a)



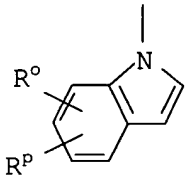
(I.b)



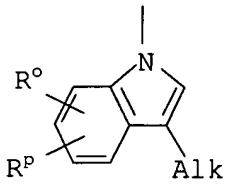
(I.c)



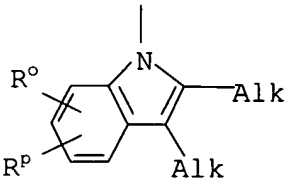
(I.d)



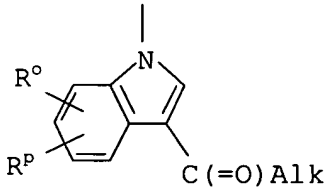
(I.e)



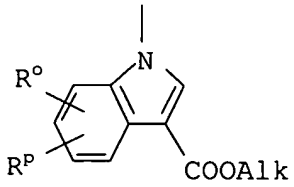
(I.f)



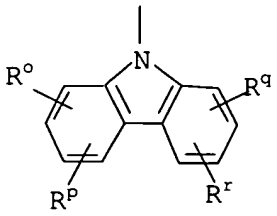
(I.g)



(I.h)



(I.i)



(I.k)

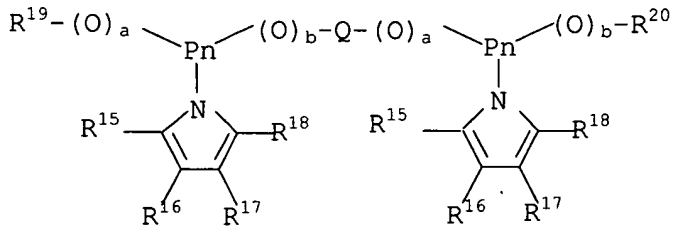
where

Alk is a C_1-C_4-alkyl group and

R^o, R^p, R^q and R^r are each, independently of one another, hydrogen, C_1-C_4-alkyl, C_1-C_4-alkoxy, acyl, halogen, trifluoromethyl, C_1-C_4-alkoxycarbonyl or carboxyl, is used.

3. (Original) A process as claimed in claim 2, wherein at least one ligand of the formula I, in which the radicals R^1, R^2, R^3 and R^4 are each, independently of one another, a 3-alkylindolyl group, preferably a 3-methylindolyl group, is used.

4. (Currently amended) A process as claimed in <u>claim 1,</u> ~~any of the preceding claims,~~ wherein the chelating pnicogen compound of the formula I is selected from among chelating pnicogen compounds of the formula II,



(II)

where

R^{15}, R^{16}, R^{17} and R^{18} are each, independently of one another, hydrogen, alkyl, cycloalkyl, heterocycloalkyl, aryl, hetaryl, $W'COOR^k$, $W'COO^-M^+$, $W'(SO_3)R^k$, $W'(SO_3)^-M^+$, $W'PO_3(R^k)(R^l)$, $W'(PO_3)^{2-}(M^+)_2$, $W'NE^4E^5$, $W'(NE^4E^5E^6)^+X^-$, $W'OR^k$, $W'SR^k$, $(CHR^lCH_2O)_yR^k$, $(CH_2NE^4)_yR^k$, $(CH_2CH_2NE^4)_yR^k$, halogen, trifluoromethyl, nitro, acyl or cyano,

where

W' is a single bond, a heteroatom or a divalent bridging group having from 1 to 20 bridge atoms,

R^k, E^4, E^5, E^6 are identical or different radicals selected from among hydrogen, alkyl, cycloalkyl and aryl,

R^l is hydrogen, methyl or ethyl,

M^+ is a cation equivalent,

X^- is an anion equivalent and

y is an integer from 1 to 240,

where two adjacent radicals R^{15}, R^{16}, R^{17} and R^{18} together with the carbon atoms of the pyrrole ring to which they are bound may also form a fused ring system having 1, 2 or 3 further rings,

with the proviso that at least one of the radicals R^{15}, R^{16}, R^{17} and R^{18} is not hydrogen and R^{19} and R^{20} are not joined to one another,

R^{19} and R^{20} are each, independently of one another, cycloalkyl, heterocycloalkyl, aryl or hetaryl, or R^{19} together with R^{15} or R^{16} and/or R^{19} together with R^{17} or R^{18} form a divalent group

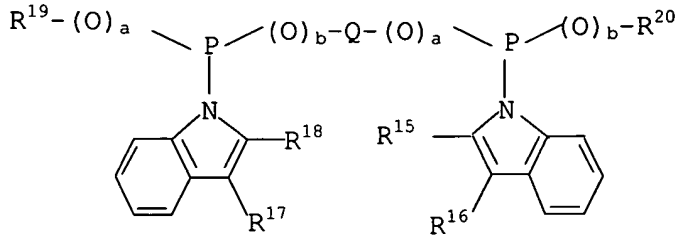
-I-W-

where

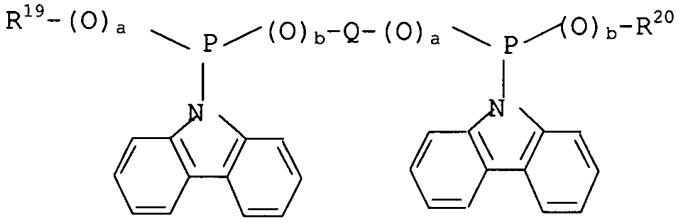
I is a chemical bond or O, S, SiR^aR^b, NR^c or substituted or unsubstituted C_1-C_{10}-alkylene, preferably CR^hRi, where R^a, R^b, R^c, R^h and R^i are each, independently of one another, hydrogen, alkyl, cycloalkyl, heterocycloalkyl, aryl or hetaryl and

W is cycloalkyl, cycloalkoxy, aryl, aryloxy, hetaryl or hetaryloxy.

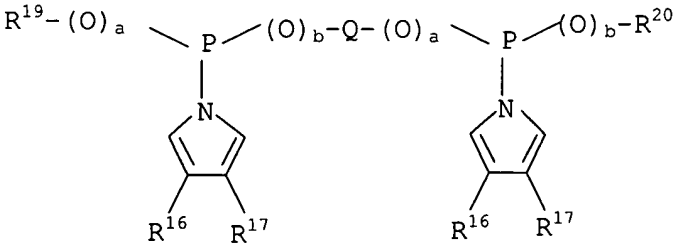
5. (Currently amended) A process as claimed in claim 1, ~~any of the preceding claims,~~ wherein the chelating pnicogen compound of the formula I is a chelating pnicogen compound of the formulae II.1 to II.3,



(II.1)



(II.2)



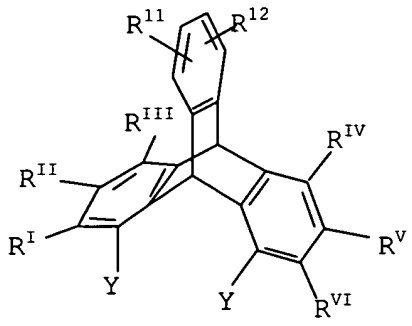
(II.3)

where

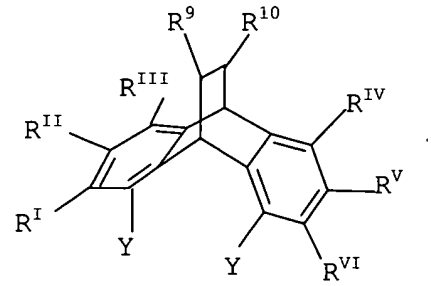
R^{15}, R^{16}, R^{17}, R^{18}, Q, a and b are as defined in claim 4, where at least one of the radicals R^{16} and R^{17} in the formula II.3 is not hydrogen,

R^{19} and R^{20} are each, independently of one another, cycloalkyl, heterocycloalkyl, aryl or hetaryl.

6. (Currently amended) A process as claimed in claim 1, ~~any of claims 1 to 5,~~ wherein the bridging group Q is a triptycenediyl group of the formula

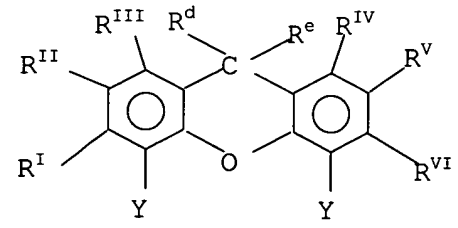


or the formula



where R^{I}, R^{II}, R^{III}, R^{IV}, R^{V} and R^{VI}, R^{9}, R^{10}, R^{11} and R^{12} are as defined in claim 1.

7. (Currently amended) A process as claimed in claim 1, ~~any of claims 1 to 5,~~ wherein the bridging group Q is a xanthenediyl group of the formula



where R^{I}, R^{II}, R^{III}, R^{IV}, RV and R^{VI} and Y are as defined in claim 1 and R^{d} and R^{e} are each, independently of one another, hydrogen, alkyl, cycloalkyl, heterocyloalkyl, aryl or hetaryl.

8. (Currently amended) A process as claimed in claim 1, ~~any of the preceding claims,~~ wherein a molar ratio of ligand to metal of transition group VIII of from 1:1 to 1000:1 is set in the reaction mixture.

9. (Currently amended) A process as claimed in claim 1, ~~any of the preceding claims,~~ wherein the reaction is carried out at from 40 to 80°C.

10. (Currently amended) A process as claimed in claim 1, ~~any of the preceding claims,~~ wherein the compound having at least two ethylenically unsaturated double bonds which is used is a a,w-diolefin.

11. (Currently amended) A process as claimed in claim 1, ~~any of the preceding claims,~~ wherein

(i) a compound having a least two ethylenically unsaturated double bonds is subjected to the hydroformylation reaction in a reaction zone,

(ii) an output is taken from the reaction zone and is fractionated to give a fraction enriched in unsaturated monoaldehydes and a fraction depleted in unsaturated monoaldehydes, and

(iii) the fraction depleted in unsaturated monoaldehydes is recirculated, ~~if appropriate~~ optionally after work up, to the reaction zone.